APPENDIX A

Western Regional Air Partnership Regional Haze Rule Reasonable Progress Summary Report, June 28, 2013

Section 6.8 Nevada

STATE AND CLASS I AREA SUMMARIES

As described in Section 2.0, each state is required to submit progress reports at interim points between submittals of Regional Haze Rule (RHR) State Implementation Plans (SIPs), which assess progress towards visibility improvement goals in each state's mandatory Federal Class I areas (CIAs). Data summaries for each CIA in each Western Regional Air Partnership (WRAP) state, which address Regional Haze Rule (RHR) requirements for visibility measurements and emissions inventories are provided in this section. These summaries are intended to provide individual states with the technical information they need to determine if current RHR implementation plan elements and strategies are sufficient to meet all established reasonable progress goals, as defined in their respective initial RHR implementation plans.

6.8 Nevada

The goal of the RHR is to ensure that visibility on the 20% most impaired, or worst, days continues to improve at each Federal Class I area (CIA), and that visibility on the 20% least impaired, or best, days does not get worse, as measured at representative Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring sites. Nevada has one mandatory Federal Class I area, which is depicted in Figure 6.8-1 and listed in Table 6.8-1, along with the associated IMPROVE monitor locations.

This section addresses differences between the 2000-2004 baseline and 2005-2009 period, for both monitored data and emission inventory estimates. Monitored data are presented for the 20% most impaired, or worst, days and for the 20% least impaired, or best, days, as per Regional Haze Rule (RHR) requirements. Annual average trend statistics for the 2000-2009 10-year period are also presented here to support assessments of changes in each monitored species that contributes to visibility impairment. In general, comparisons of anthropogenic emissions inventory totals for the state showed net decreases, while several of the monitored species increased. Because the JARB1 site is on the northern edge of Nevada, it is likely that regional emissions sources from outside of the state influences the increases in monitored data. Some additional highlights regarding comparisons between the 2000-2004 baseline and 2005-2009 progress period are listed below, and more detailed state specific information is provided in monitoring and emissions sub-sections that follow.

- For the 20% best days, the 5-year average deciview metric decreased at the JARB1 site.
- For the 20% worst days, the 5-year average deciview metric increased at the JARB1, site.
- The increase in the 20% worst day 5-year average deciview value was due to small increases in all aerosol species except particulate organic mass. For these increases:
  - No statistically significant increasing annual trends for any aerosol species occurred for the period 2000-2009.
  - Higher than average monitored ammonium sulfate and ammonium nitrate concentrations in 2005 influenced the 5-year progress period average for these species.
- Emissions inventories indicated net decreases for SO_2 and NO_X between the baseline and 2008 emission inventories. For emissions comparisons:
  - Slight increases in on-road mobile and area source inventory totals were offset by larger decreases in point and off-road mobile totals.
  - Annual total EGU emissions for the state showed dramatic decreases in SO_2 and NO_X.
- The fine soil and coarse mass emissions inventories showed increases in fugitive dust and natural windblown dust, which was likely due to updates in inventory development methodologies rather than actual increases.

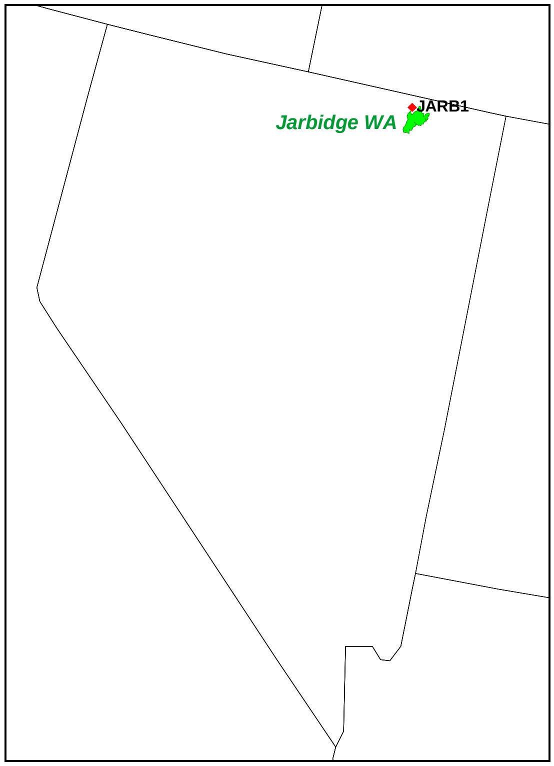

Figure 6.8-1. Map Depicting the Federal CIA and Representative IMPROVE Monitor in Nevada.

Table 6.8-1
Nevada Class I Area and Representative IMPROVE Monitor

Class I Area	Representative IMPROVE Site	Latitude	Longitude	Elevation (m)
Jarbidge WA	JARB1	41.89	-115.43	1869

6.8.1 Monitoring Data

This section addresses RHR regulatory requirements for monitored data as measured by the JARB1 IMPROVE monitor, representing the Jarbidge Wilderness Area, which is the only Federal CIA in Nevada. These summaries are supported by regional data presented in Section 4.0 and by more detailed site specific tables and charts in Appendix H.

As described in Section 3.1, regional haze progress in Federal CIAs is tracked using calculations based on speciated aerosol mass as collected by IMPROVE monitors. The RHR calls for tracking haze in units of deciviews (dv), where the deciview metric was designed to be linearly associated with human perception of visibility. In a pristine atmosphere, the deciview metric is near zero, and a one deciview change is approximately equivalent to a 10% change in cumulative species extinction. To better understand visibility conditions, summaries here include both the deciview metric, and the apportionment of haze into extinction due to the various measured species in units of inverse megameters (Mm^{-1}).

6.8.1.1 Current Conditions

This section addresses the regulatory question, ***what are the current visibility conditions for the most impaired and least impaired days (40 CFR 51.308 (g)(3)(i))?*** RHR guidance specifies that 5-year averages be calculated over successive 5-year periods, i.e. 2000-2004, 2005-2009, 2010-2014, etc.[1] Current visibility conditions are represented here as the most recent successive 5-year average period available, or the 2005-2009 period average, although the most recent IMPROVE monitoring data currently available includes 2010 data.

Tables 6.8-2 and 6.8-3 present the calculated deciview values for the JARB1 site, along with the percent contribution to extinction from each aerosol species for the 20% most impaired and 20% least impaired days. Figure 6.8-2 presents 5-year average extinction for the current progress period for both the 20% most impaired and 20% least impaired days. Note that the percentages in the tables consider only the aerosol species which contribute to extinction, while the charts also show Rayleigh, or scattering due to background gases in the atmosphere.

Specific observations for the current visibility conditions on the 20% most impaired, or worst, days are as follows:

- The largest contributor to aerosol extinction on the worst days at the JARB1 site was particulate organic mass, followed by coarse mass and ammonium sulfate.

Specific observations for the current visibility conditions on the 20% least impaired, or best, days are as follows:

- Rayleigh, or background visibility impairment in clean air, contributed to approximately 80% of the total extinction (in Mm^{-1}) for the best days. Aerosol species contributions in Table 6.8-3 exclude the Rayleigh portion of extinction.
- Ammonium sulfate is the largest contributor to aerosol extinction for the best days.

[1] EPA's September 2003 *Guidance for Tracking Progress Under the Regional Haze Rule* specifies that progress is tracked against the 2000-2004 baseline period using corresponding averages over successive 5-year periods, i.e. 2005-2009, 2010-2014, etc. (See page 4-2 in the Guidance document.)

Table 6.8-2
Nevada Class I Area IMPROVE Site
Current Visibility Conditions
2005-2009 Progress Period, 20% Most Impaired Days

Site	Deciviews (dv)	Percent Contribution to Aerosol Extinction by Species (Excludes Rayleigh) (% of Mm^{-1}) and Rank*						
		Ammonium Sulfate	Ammonium Nitrate	Particulate Organic Mass	Elemental Carbon	Soil	Coarse Mass	Sea Salt
JARB1	12.4	17% (3)	5% (6)	**38% (1)**	7% (5)	10% (4)	22% (2)	1% (7)

*Highest aerosol species contribution per site is highlighted in bold.

Table 6.8-3
Nevada Class I Area IMPROVE Site
Current Visibility Conditions
2005-2009 Progress Period, 20% Least Impaired Days

Site	Deciviews (dv)	Percent Contribution to Aerosol Extinction by Species (Excludes Rayleigh) (% of Mm^{-1}) and Rank*						
		Ammonium Sulfate	Ammonium Nitrate	Particulate Organic Mass	Elemental Carbon	Soil	Coarse Mass	Sea Salt
JARB1	2.2	**47% (1)**	8% (4)	19% (2)	7% (5)	4% (6)	13% (3)	2% (7)

*Highest aerosol species contribution per site is highlighted in bold.

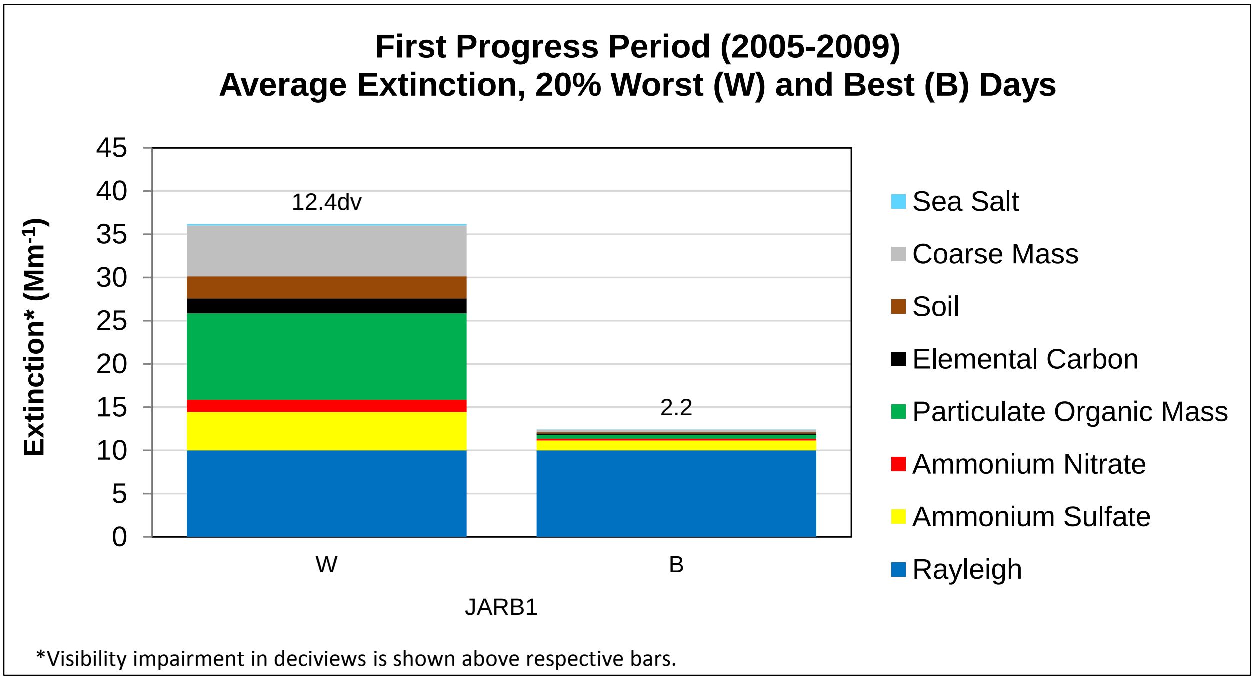

Figure 6.8-2. Average Extinction for Current Progress Period (2005-2009) for the Worst (Most Impaired) and Best (Least Impaired) Days Measured at the Nevada Class I Area IMPROVE Site.

6.8.1.2 Differences between Current and Baseline Conditions

This section addresses the regulatory question, ***what is the difference between current visibility conditions for the most impaired and least impaired days and baseline visibility conditions (40 CFR 51.308 (g)(3)(ii))?*** Included here are comparisons between the 5-year average baseline conditions (2000-2004) and current progress period extinction (2005-2009).

Table 6.8-4 presents the differences between the 2000-2004 baseline period average extinction and the 2005-2009 progress period average for the JARB1 site in Nevada for the 20% most impaired days, and Table 6.8-5 presents similar data for the least impaired days. Averages that increased are depicted in red text and averages that decreased in blue.

Figure 6.8-3 presents the 5-year average extinction for the baseline and current progress period averages for the worst days and Figure 6.8-4 presents the differences in averages by aerosol species, with increases represented above the zero line and decreases below the zero line. Figures 6.8-5 and 6.8-6 present similar plots for the best days.

For the 20% most impaired days, the 5-year average RHR deciview metric increased at the JARB1 site. Notable differences for individual species averages on the most impaired days were as follows:

- All species except particulate organic mass increased slightly at the JARB1 site. The largest increases were measured for ammonium sulfate, coarse mass and ammonium nitrate.
- Increases in 5-year average ammonium nitrate at the JARB1 monitor were influenced by higher than average ammonium nitrate in 2005, where anomalously high measurements on December 18, 2005, as depicted in Appendix H, Figure H.1-8, influenced the annual average.

For the 20% least impaired or best days, the 5-year average deciview metric decreased at the JARB1 site. Notable differences for individual species averages on the best impaired days were as follows:

- The largest decrease on the best days was measured for particulate organic mass. Soil, coarse mass and sea salt measured very small increases for the best days.

Table 6.8-4
Nevada Class I Area IMPROVE Sites
Difference in Aerosol Extinction by Species
2000-2004 Baseline Period to 2005-2009 Progress Period
20% Most Impaired Days

Site	Deciview (dv)			Change in Extinction by Species (Mm^{-1})*						
	2000-2004 Baseline Period	2005-2009 Progress Period	Change in dv*	Amm. Sulfate	Amm. Nitrate	POM	EC	Soil	CM	Sea Salt
JARB1	12.1	12.4	+0.3	+0.4	+0.3	0.0	+0.1	+0.2	+0.4	+0.1

*Change is calculated as progress period average minus baseline period average. Values in red indicate increases in extinction and values in blue indicate decreases.

Table 6.8-5
Nevada Class I Area IMPROVE Sites
Difference in Aerosol Extinction by Species
2000-2004 Baseline Period to 2005-2009 Progress Period
20% Least Impaired Days

Site	Deciview (dv)			Change in Extinction by Species (Mm^{-1})*						
	2000-2004 Baseline Period	2005-2009 Progress Period	Change in dv*	Amm. Sulfate	Amm. Nitrate	POM	EC	Soil	CM	Sea Salt
JARB1	2.6	2.2	-0.4	-0.1	-0.1	-0.3	-0.1	0.0	0.0	0.0

*Change is calculated as progress period average minus baseline period average. Values in red indicate increases in extinction and values in blue indicate decreases.

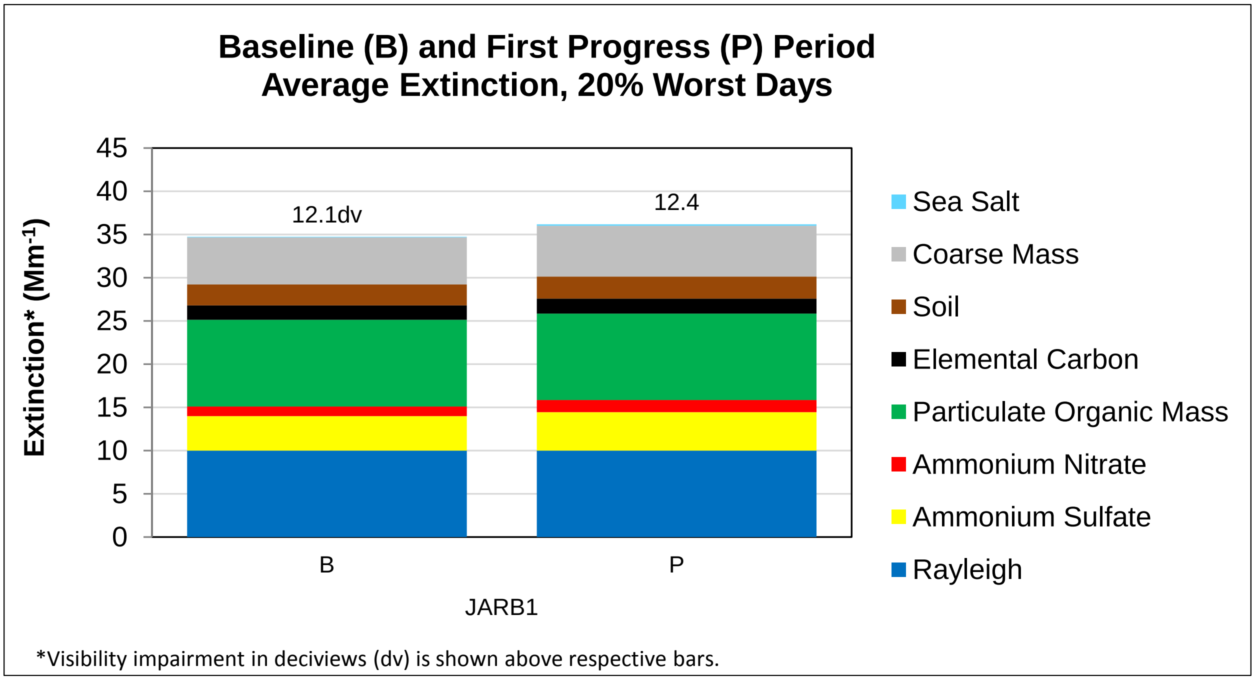

Figure 6.8-3. Average Extinction for Baseline and Progress Period Extinction for Worst (Most Impaired) Days Measured at the Nevada Class I Area IMPROVE Site.

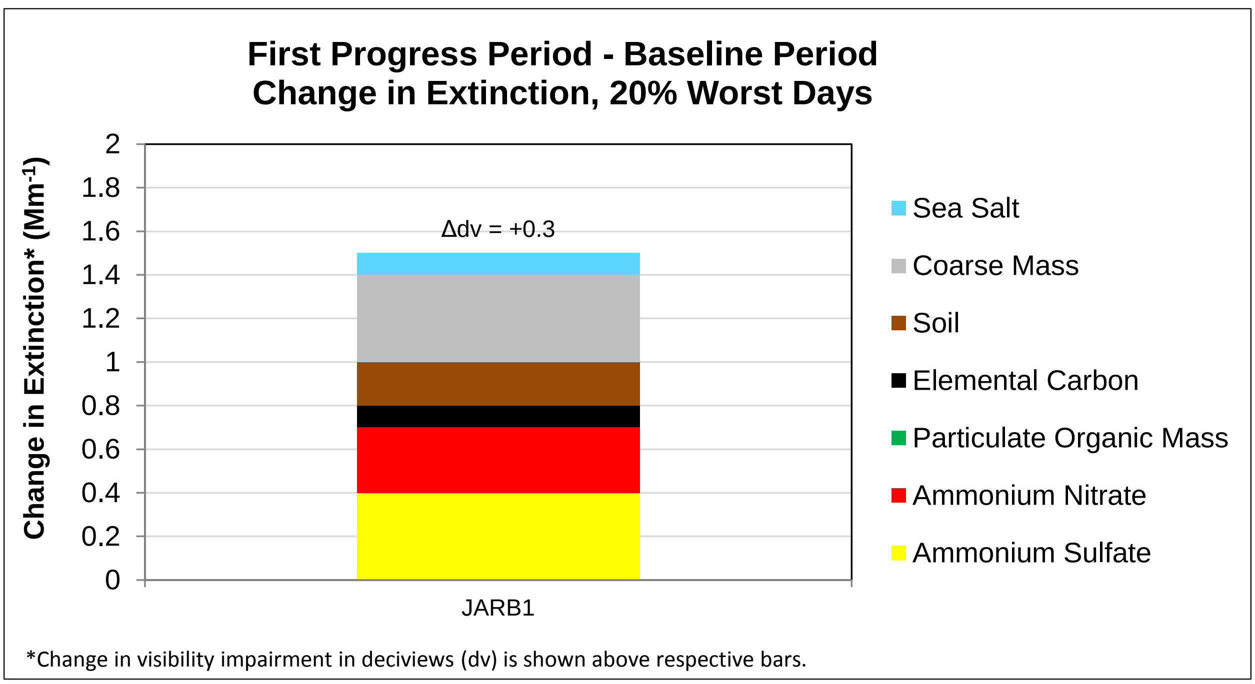

Figure 6.8-4. Difference between Average Extinction for Current Progress Period (2005-2009) and Baseline Period (2000-2004) for the Worst (Most Impaired) Days Measured at the Nevada Class I Area IMPROVE Site.

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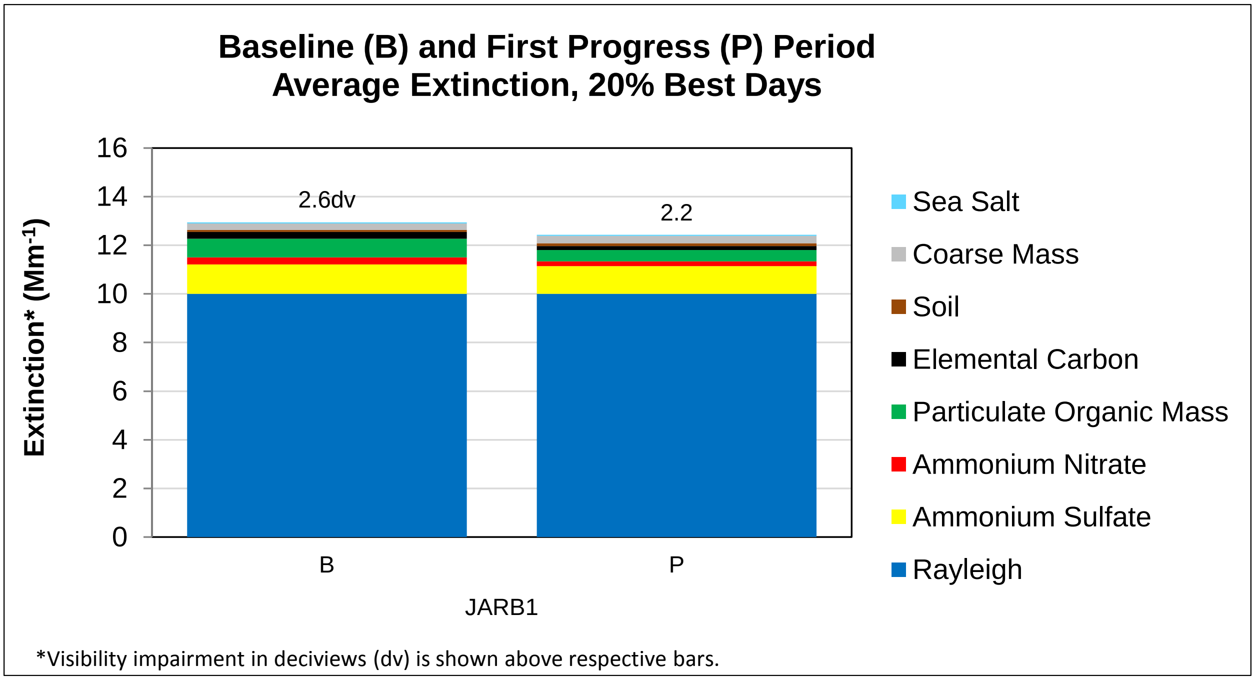

Figure 6.8-5. Average Extinction for Baseline and Progress Period Extinction for Best (Least Impaired) Days Measured at the Nevada Class I Area IMPROVE Site.

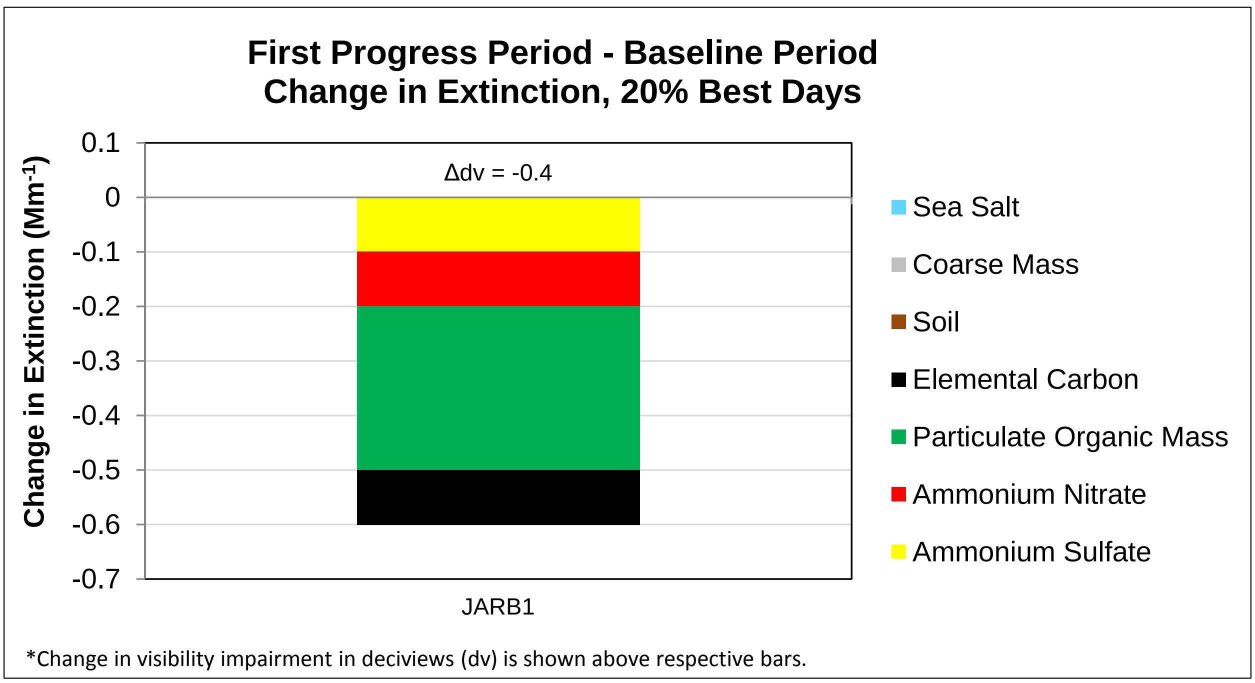

Figure 6.8-6. Difference between Average Extinction for Current Progress Period (2005-2009) and Baseline Period (2000-2004) for the Best (Least Impaired) Days Measured at the Nevada Class I Area IMPROVE Site.

6.8.1.3 Changes in Visibility Impairment

This section addresses the regulatory question, ***what is the change in visibility impairment for the most impaired and least impaired days over the past 5 years (40 CFR 51.308 (g)(3)(iii))?*** Included here are changes in visibility impairment as characterized by annual average trend statistics, and some general observations regarding local and regional events and outliers on a daily and annual basis that affected the current 5-year progress period. The regulatory requirement asks for a description of changes over the past 5-year period, but trend analysis is better suited to longer periods of time, so trends for the entire 10-year planning period are presented here.

Trend statistics for the years 2000-2009 for species at the Nevada site are summarized in Table 6.8-6, and regional trends were presented earlier in Section 4.1.1.[2] Only trends for aerosol species trends with p-value statistics less than 0.15 (85% confidence level) are presented in the table here, with increasing slopes in red and decreasing slopes in blue.[3] In some cases, trends may show decreasing tendencies while the difference between the 5-year averages do not (or vice versa), as discussed in Section 3.1.2.2. In these cases, the 5-year average for the best and worst days is the important metric for RHR regulatory purposes, but trend statistics may be of value to understand and address visibility impairment issues for planning purposes.

For each site, a more comprehensive list of all trends for all species, including the associated p-values, is provided in Appendix H. Additionally, this appendix includes plots depicting 5-year, annual, monthly, and daily average extinction for each site. These plots are intended to provide a fairly comprehensive compilation of reference information for individual states to investigate local and regional events and outliers that may have influenced changes in visibility impairment as tracked using the 5-year deciview metrics. Note that similar summary products are also available from the WRAP TSS website (http://vista.cira.colostate.edu/tss/). Some general observations regarding changes in visibility impairment at sites in Nevada are as follows:

- No increasing aerosol trends were observed at the JARB1 site for the best, worst or all sample days.
- Only particulate organic mass (20% best and all days) and elemental carbon (20% worst days) exhibited statistically significant trends, all decreasing. All other species did not show statistically significant trends for the best, worst or all days from 2000 to 2009.

[2] Annual trends were calculated for the years 2000-2009, with a trend defined as the slope derived using Theil statistics. Trends derived from Theil statistics are useful in analyzing changes in air quality data because these statistics can show the overall tendency of measurements over long periods of time, while minimizing the effects of year-to-year fluctuations which are common in air quality data. Theil statistics are also used in EPA's National Air EPA's National Air Quality Trends Reports (http://www.epa.gov/airtrends/) and the IMPROVE program trend reports (http://vista.cira.colostate.edu/improve/Publications/improve_reports.htm)

[3] The significance of the trend is represented with p-values calculated using Mann-Kendall trend statistics. Determining a significance level helps to distinguish random variability in data from a real tendency to increase or decrease over time, where lower p-values indicate higher confidence levels in the computed slopes.

Table 6.8-6
Nevada Class I Area IMPROVE Site
Change in Aerosol Extinction by Species
2000-2009 Annual Average Trends

Site	Group	Annual Trend* (Mm^{-1}/year)						
		Ammonium Sulfate	Ammonium Nitrate	Particulate Organic Mass	Elemental Carbon	Soil	Coarse Mass	Sea Salt
JARB1	20% Best	0.0	0.0	**-0.1**	0.0	0.0	--	--
	20% Worst	--	--	--	**-0.1**	--	--	--
	All Days	--	0.0	**-0.1**	0.0	--	--	0.0

*(--) Indicates statistically insignificant trend (<85% confidence level). Annual averages and complete trend statistics for all significance levels are included for each site in Appendix H.

6.8.2 Emissions Data

Included here are summaries depicting differences between two emission inventory years that are used to represent the 5-year baseline and current progress periods. The baseline period is represented using a 2002 inventory developed by the WRAP for use in the initial WRAP state SIPs, and the progress period is represented by a 2008 inventory which leverages recent WRAP inventory work for modeling efforts, as referenced in Section 3.2.1. For reference, Table 6.8-7 lists the major emitted pollutants inventoried, the related aerosol species, some of the major sources for each pollutant, and some notes regarding implications of these pollutants. Differences between these baseline and progress period inventories, and a separate summary of annual emissions from electrical generating units (EGUs), are presented in this section.

Table 6.8-7
Nevada
Pollutants, Aerosol Species, and Major Sources

Emitted Pollutant	**Related Aerosol**	**Major Sources**	**Notes**
Sulfur Dioxide (SO_2)	Ammonium Sulfate	Point Sources; On- and Off-Road Mobile Sources	SO_2 emissions are generally associated with anthropogenic sources such as coal-burning power plants, other industrial sources such and refineries and cement plants, and both on- and off-road diesel engines.
Oxides of Nitrogen (NO_X)	Ammonium Nitrate	On- and Off-Road Mobile Sources; Point Sources; Area Sources	NO_X emissions are generally associated with anthropogenic sources. Common sources include virtually all combustion activities, especially those involving cars, trucks, power plants, and other industrial processes.
Ammonia (NH_3)	Ammonium Sulfate and Ammonium Nitrate	Area Sources; On-Road Mobile Sources	Gaseous NH_3 has implications in particle formation because it can form particulate ammonium. Ammonium is not directly measured by the IMPROVE program, but affects formation potential of ammonium sulfate and ammonium nitrate. All measured nitrate and sulfate is assumed to be associated with ammonium for IMPROVE reporting purposes.
Volatile Organic Compounds (VOCs)	Particulate Organic Mass (POM)	Biogenic Emissions; Vehicle Emissions; Area Sources	VOCs are gaseous emissions of carbon compounds, which are often converted to POM through chemical reactions in the atmosphere. Estimates for biogenic emissions of VOCs have undergone significant updates since 2002, so changes reported here are more reflective of methodology changes than actual changes in emissions (see Section 3.2.1).
Primary Organic Aerosol (POA)	POM	Wildfires; Area Sources	POA represents organic aerosols that are emitted directly as particles, as opposed to gases. Wildfires in the west generally dominate POA emissions, and large wildfire events are generally sporadic and highly variable from year-to-year.
Elemental Carbon (EC)	EC	Wildfires; On- and Off-Road Mobile Sources	Large EC events are often associated with large POM events during wildfires. Other sources include both on- and off-road diesel engines.
Fine soil	Soil	Windblown Dust; Fugitive Dust; Road Dust; Area Sources	Fine soil is reported here as the crustal or soil components of $PM_{2.5}$.
Coarse Mass (PMC)	Coarse Mass	Windblown Dust; Fugitive Dust	Coarse mass is reported by the IMPROVE Network as the difference between PM_{10} and $PM_{2.5}$ mass measurements. Coarse mass is not separated by species in the same way that $PM_{2.5}$ is speciated, but these measurements are generally associated with crustal components. Similar to crustal $PM_{2.5}$, natural windblown dust is often the largest contributor to PMC.

6.8.2.1 Changes in Emissions

This section addresses the regulatory question, ***what is the change over the past 5 years in emissions of pollutants contributing to visibility impairment from all sources and activities within the State (40 CFR 51.308 (g)(4))?*** For these summaries, emissions during the baseline years are represented using a 2002 inventory, which was developed with support from the WRAP for use in the original RHR SIP strategy development (termed plan02d). Differences between inventories are represented as the difference between the 2002 inventory, and a 2008 inventory which leverages recent inventory development work performed by the WRAP for the WestJumpAQMS and DEASCO_3 modeling projects (termed WestJump2008). Note that the comparisons of differences between inventories does not necessarily reflect a change in emissions, as a number of methodology changes and enhancements have occurred between development of the individual inventories, as referenced in Section 3.2.1. Inventories for all major visibility impairing pollutants are presented for major source categories, and categorized as either anthropogenic or natural emissions. State-wide inventories totals and differences are presented here, and inventory totals on a county level basis are available on the WRAP Technical Support System website (http://vista.cira.colostate.edu/tss/).

Table 6.8-8 and Figure 6.8-7 present the differences between the 2002 and 2008 sulfur dioxide (SO_2) inventories by source category. Tables 6.8-9 and Figure 6.8-8 present data for oxides of nitrogen (NO_X), and subsequent tables and figures (Tables 6.8-10 through 6.8-15 and Figures 6.8-9 through 6.8-14) present data for ammonia (NH_3), volatile organic compounds (VOCs), primary organic aerosol (POA), elemental carbon (EC), fine soil and coarse mass. General observations regarding emissions inventory comparisons are listed below.

- State-wide SO_2 inventory totals show a 75% reduction, with some decreases reported for all source categories. The largest decreases are reported from point sources, followed by area sources, natural fire and off-road mobile sources.
- NO_X emissions show a 22% reduction, with area and on-road mobile sources showing significant increases, while all other source categories show decreases. The largest decreases were reported from point sources, followed by off-road mobile, biogenic emissions, and natural fire sources. Note that decreases in biogenic sources were consistent for all contiguous WRAP states, and likely due to inventory enhancements in 2008. Also, current natural fire emissions represent only the year 2008, so all fire events for the 2005-2009 progress period are not represented in these emissions comparison results. Also, for off-road sources, the reclassification of some off-road mobile sources (such as some types of marine vessels and locomotives) into the area source category in 2008, which may have contributed to decreases in the off-road inventory totals, but increases in area source totals.
- Ammonia emission inventory totals decreased by 34%, with decreases due mostly to area and off-road mobile sources.
- VOC emissions showed a 61% decrease, mostly due to biogenic emission inventories. A significant increase is shown for area sources. Significant decreases are shown for biogenic, on-road mobile and natural fire sources. The large difference in biogenic emissions is likely due to enhancements in biogenic inventory methodology, as

described in Section 3.2, rather than decreases of this magnitude in actual emissions. Also, current natural fire emissions represent only the year 2008, so all fire events for the 2005-2009 progress period are not represented in these emissions comparison results.

- POA showed 52% decrease in inventory totals, and elemental carbon showed a 31% decrease, mostly due to natural fire sources. Note that current natural fire emissions represent only the year 2008, so all fire events for the 2005-2009 progress period are not represented in these emissions comparison results.
- Fine soil and coarse mass increased for the windblown dust inventory comparisons and the combined fugitive/road dust inventories. The large increases in windblown dust are likely due in part to enhancements in dust inventory methodology, as described in Section 3.2, rather than increases in actual emissions. Most other sources of fine soil and coarse mass showed increases with the exception of natural fire sources for both pollutants, on-road mobile sources for fine soil, and point sources for coarse mass.

Table 6.8-8
Nevada
Sulfur Dioxide Emissions by Category

Source Category	Sulfur Dioxide Emissions (tons/year)		
	2002 (Plan02d)	**2008 (WestJump2008)**	**Difference (Percent Change)**
Anthropogenic Sources			
Point	50,720	11,155	-39,565
Area	12,953	4,863	-8,090
On-Road Mobile	454	298	-156
Off-Road Mobile	1,403	322	-1,081
Area Oil and Gas	0	0	0
Fugitive and Road Dust	0	0	0
Anthropogenic Fire	12	2	-11
Total Anthropogenic	**65,543**	**16,641**	**-48,903 (-75%)**
Natural Sources			
Natural Fire	2,200	506	-1,695
Biogenic	0	0	0
Wind Blown Dust	0	0	0
Total Natural	**2,200**	**506**	**-1,695 (-77%)**
All Sources			
Total Emissions	**67,743**	**17,146**	**-50,597 (-75%)**

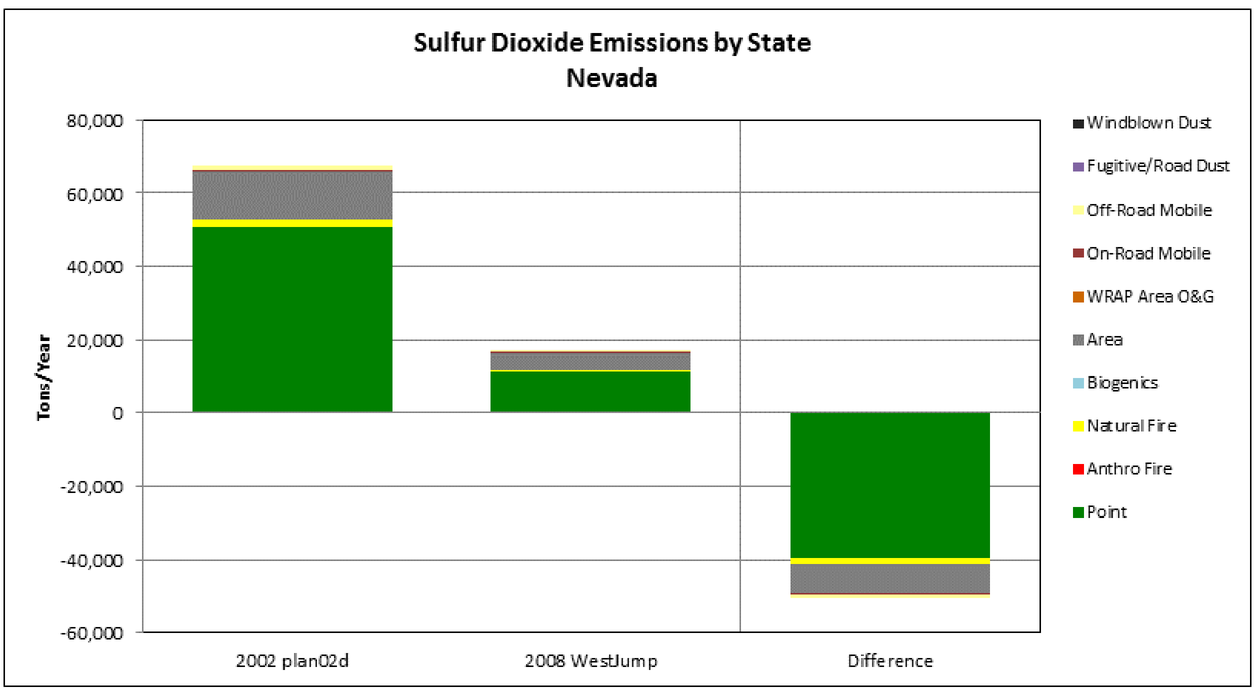

Figure 6.8-7. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Sulfur Dioxide by Source Category for Nevada.

Table 6.8-9
Nevada
Oxides of Nitrogen Emissions by Category

Source Category	Oxides of nitrogen Emissions (tons/year)		
	2002 (Plan02d)	**2008 (WestJump2008)**	**Difference (Percent Change)**
Anthropogenic Sources			
Point	59,864	30,090	-29,774
Area	5,725	11,321	5,597
On-Road Mobile	41,089	50,068	8,979
Off-Road Mobile	32,565	17,081	-15,484
Area Oil and Gas	63	0	-63
Fugitive and Road Dust	0	0	0
Anthropogenic Fire	48	13	-35
Total Anthropogenic	**139,353**	**108,574**	**-30,779 (-22%)**
Natural Sources			
Natural Fire	8,026	3,575	-4,451
Biogenic	15,018	7,364	-7,654
Wind Blown Dust	0	0	0
Total Natural	**23,044**	**10,939**	**-12,105 (-53%)**
All Sources			
Total Emissions	**162,397**	**119,513**	**-42,885 (-26%)**

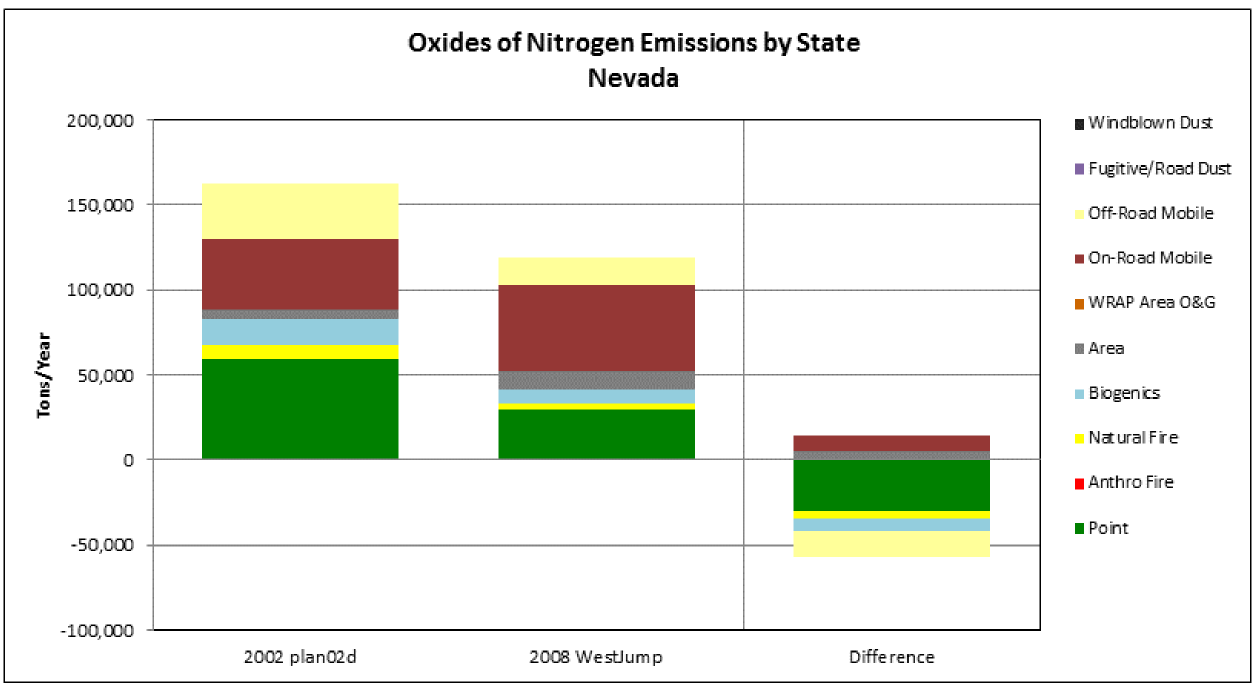

Figure 6.8-8. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Oxides of nitrogen by Source Category for Nevada.

Table 6.8-10
Nevada
Ammonia Emissions by Category

Source Category	Ammonia Emissions (tons/year)		
	2002 (Plan02d)	**2008 (WestJump2008)**	**Difference (Percent Change)**
Anthropogenic Sources			
Point	339	302	-37
Area	8,009	5,717	-2,293
On-Road Mobile	2,030	849	-1,182
Off-Road Mobile	22	20	-2
Area Oil and Gas	0	0	0
Fugitive and Road Dust	0	0	0
Anthropogenic Fire	8	6	-2
Total Anthropogenic	**10,408**	**6,893**	**-3,515 (-34%)**
Natural Sources			
Natural Fire	1,684	2,490	805
Biogenic	0	0	0
Wind Blown Dust	0	0	0
Total Natural	**1,684**	**2,490**	**805 (48%)**
All Sources			
Total Emissions	**12,092**	**9,382**	**-2,710 (-22%)**

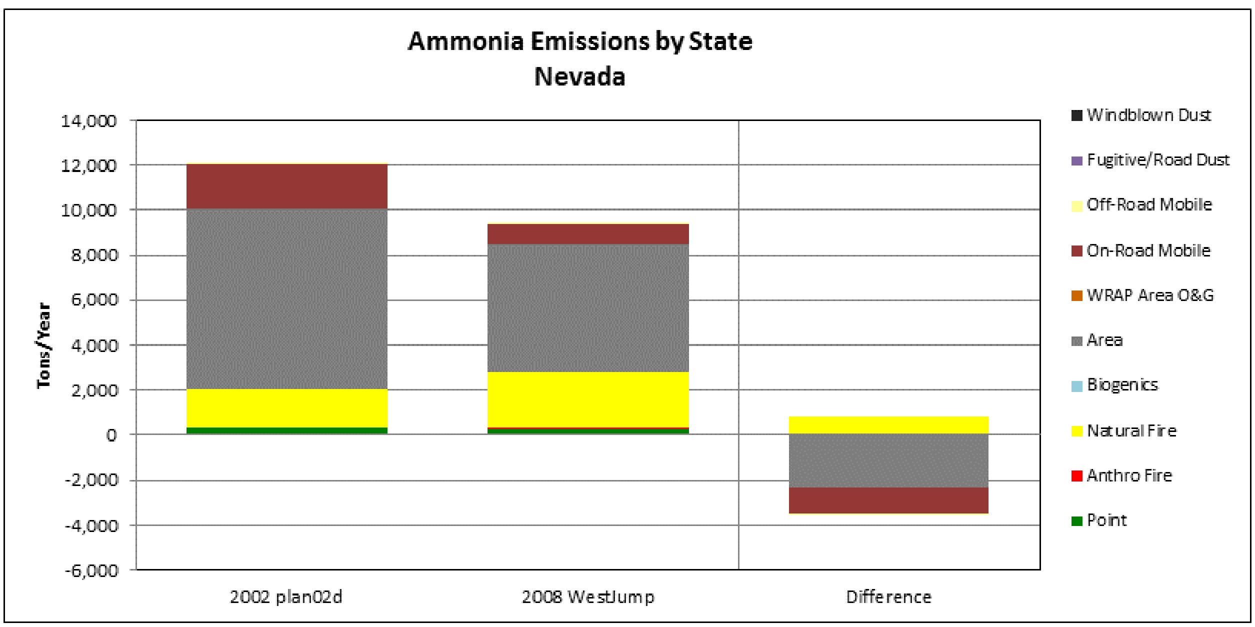

Figure 6.8-9. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Ammonia by Source Category for Nevada.

Table 6.8-11
Nevada
Volatile Organic Compound Emissions by Category

Source Category	Volatile Organic Compound Emissions (tons/year)		
	2002 (Plan02d)	**2008 (WestJump2008)**	**Difference (Percent Change)**
Anthropogenic Sources			
Point	2,215	2,953	738
Area	28,592	40,973	12,381
On-Road Mobile	36,257	21,302	-14,955
Off-Road Mobile	18,094	18,783	688
Area Oil and Gas	129	0	-129
Fugitive and Road Dust	0	0	0
Anthropogenic Fire	70	16	-54
Total Anthropogenic	**85,357**	**84,026**	**-1,331 (-2%)**
Natural Sources			
Natural Fire	17,606	4,204	-13,403
Biogenic	794,139	262,912	-531,227
Wind Blown Dust	0	0	0
Total Natural	**811,745**	**267,115**	**-544,630 (-67%)**
All Sources			
Total Emissions	**897,102**	**351,142**	**-545,960 (-61%)**

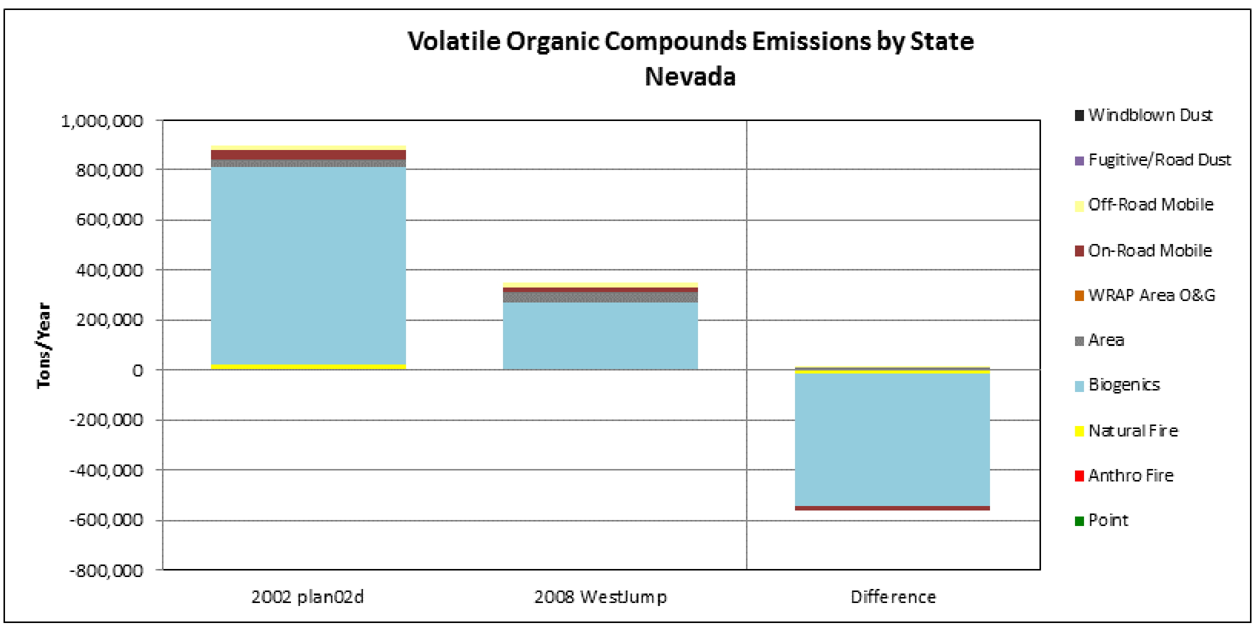

Figure 6.8-10. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Volatile Organic Compounds by Source Category for Nevada.

Table 6.8-12
Nevada
Primary Organic Aerosol Emissions by Category

Source Category	Primary Organic Aerosol Emissions (tons/year)		
	2002 (Plan02d)	**2008 (WestJump2008)**	**Difference (Percent Change)**
Anthropogenic Sources			
Point*	256	46	-210
Area	687	2,283	1,596
On-Road Mobile	314	1,053	739
Off-Road Mobile	572	689	117
Area Oil and Gas	0	0	0
Fugitive and Road Dust	332	891	559
Anthropogenic Fire	73	22	-51
Total Anthropogenic	**2,233**	**4,985**	**2,751 (>100%)**
Natural Sources			
Natural Fire	22,501	6,831	-15,670
Biogenic	0	0	0
Wind Blown Dust	0	0	0
Total Natural	**22,501**	**6,831**	**-15,670 (-70%)**
All Sources			
Total Emissions	**24,734**	**11,816**	**-12,918 (-52%)**

*Point source data includes only oil and gas and regulated CEM sources. More comprehensive point source data were not available at the time this report was prepared but will be made available through the WRAP TSS (http://vista.cira.colostate.edu/tss/).

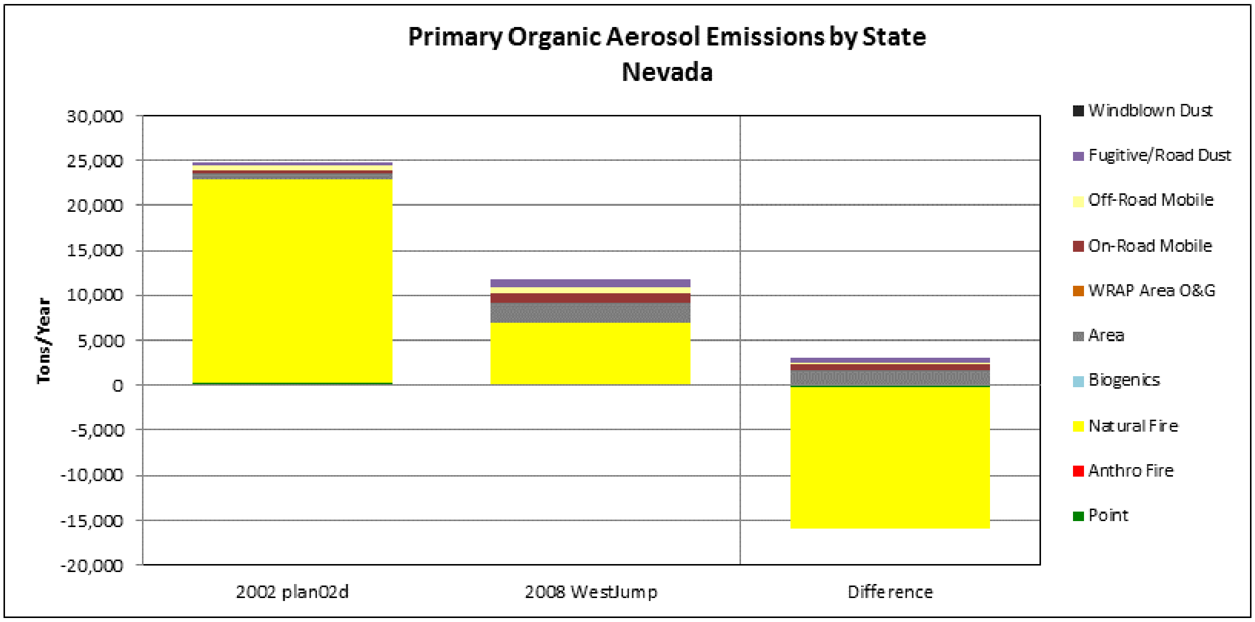

Figure 6.8-11. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Primary Organic Aerosol by Source Category for Nevada.

Table 6.8-13
Nevada
Elemental Carbon Emissions by Category

Source Category	Elemental Carbon Emissions (tons/year)		
	2002 (Plan02d)	2008 (WestJump2008)	Difference (Percent Change)
Anthropogenic Sources			
Point*	13	64	50
Area	96	368	272
On-Road Mobile	235	1,891	1,656
Off-Road Mobile	1,354	954	-400
Area Oil and Gas	0	0	0
Fugitive and Road Dust	24	14	-10
Anthropogenic Fire	13	6	-8
Total Anthropogenic	**1,735**	**3,295**	**1,561 (90%)**
Natural Sources			
Natural Fire	4,674	1,130	-3,544
Biogenic	0	0	0
Wind Blown Dust	0	0	0
Total Natural	**4,674**	**1,130**	**-3,544 (-76%)**
All Sources			
Total Emissions	**6,409**	**4,425**	**-1,984 (-31%)**

*Point source data includes only oil and gas and regulated CEM sources. More comprehensive point source data were not available at the time this report was prepared but will be made available through the WRAP TSS (http://vista.cira.colostate.edu/tss/).

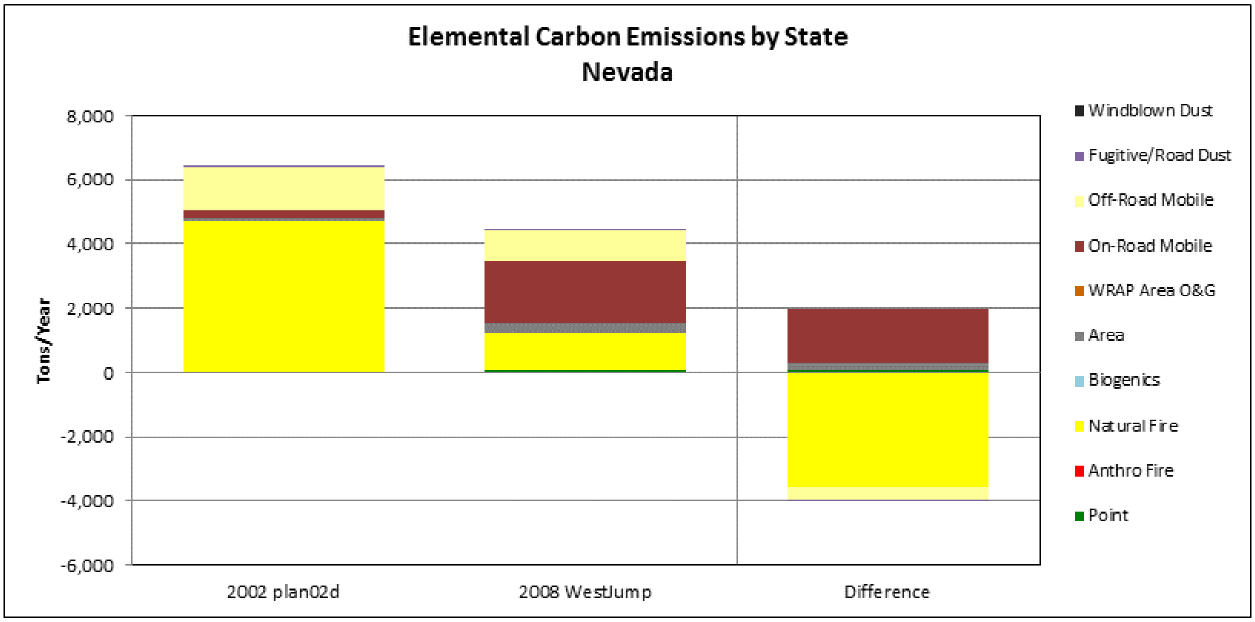

Figure 6.8-12. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Elemental Carbon by Source Category for Nevada.

Table 6.8-14
Nevada
Fine Soil Emissions by Category

Source Category	Fine Soil Emissions (tons/year)		
	2002 (Plan02d)	**2008 (WestJump2008)**	**Difference (Percent Change)**
Anthropogenic Sources			
Point*	2,158	209	-1,948
Area	830	1,024	195
On-Road Mobile	239	190	-49
Off-Road Mobile	0	49	49
Area Oil and Gas	0	0	0
Fugitive and Road Dust	6,128	19,216	13,087
Anthropogenic Fire	9	10	1
Total Anthropogenic	**9,364**	**20,698**	**11,334 (>100%)**
Natural Sources			
Natural Fire	1,406	2,552	1,146
Biogenic	0	0	0
Wind Blown Dust	10,438	17,051	6,613
Total Natural	**11,845**	**19,603**	**7,758 (66%)**
All Sources			
Total Emissions	**21,208**	**40,301**	**19,092 (90%)**

*Point source data includes only oil and gas and regulated CEM sources. More comprehensive point source data were not available at the time this report was prepared but will be made available through the WRAP TSS (http://vista.cira.colostate.edu/tss/).

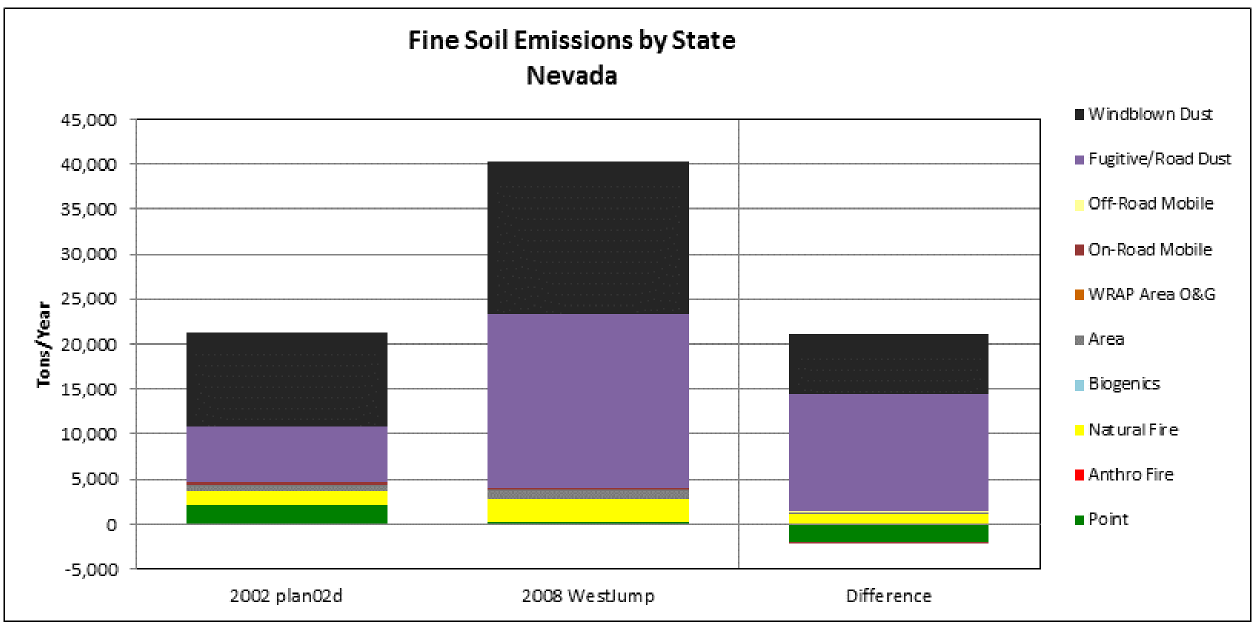

Figure 6.8-13. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Fine Soil by Source Category for Nevada.

Table 6.8-15

Nevada
Coarse Mass Emissions by Category

Source Category	**Coarse Mass Emissions (tons/year)**		
	2002 (Plan02d)	**2008 (WestJump2008)**	**Difference (Percent Change)**
Anthropogenic Sources			
Point*	4,093	1,761	-2,331
Area	897	1,094	198
On-Road Mobile	245	2,014	1,769
Off-Road Mobile	0	82	82
Area Oil and Gas	0	0	0
Fugitive and Road Dust	56,779	161,532	104,753
Anthropogenic Fire	7	4	-3
Total Anthropogenic	**62,020**	**166,488**	**104,468 (>100%)**
Natural Sources			
Natural Fire	5,176	1,310	-3,866
Biogenic	0	0	0
Wind Blown Dust	93,946	153,459	59,513
Total Natural	**99,122**	**154,769**	**55,647 (56%)**
All Sources			
Total Emissions	**161,142**	**321,257**	**160,115 (99%)**

*Point source data includes only oil and gas and regulated CEM sources. More comprehensive point source data were not available at the time this report was prepared but will be made available through the WRAP TSS (http://vista.cira.colostate.edu/tss/).

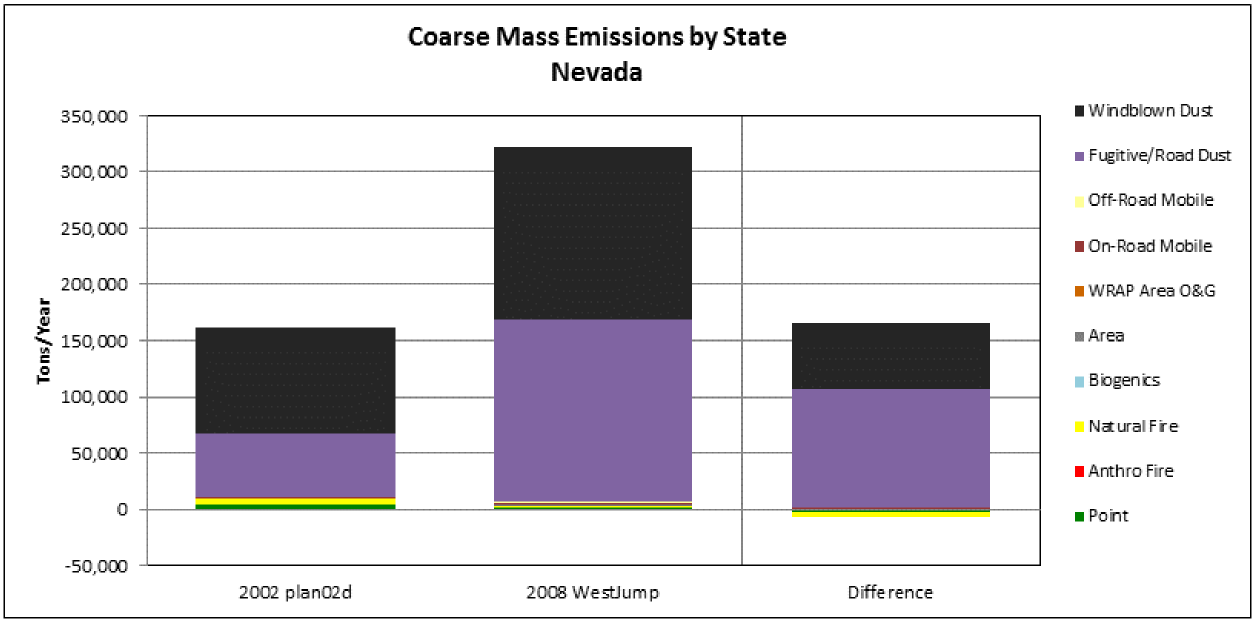

Figure 6.8-14. 2002 and 2008 Emission and Difference between Emissions Inventory Totals, for Coarse Mass by Source Category for Nevada.

6.8.2.2 EGU Summary

As described in previous sections, differences between the baseline and progress period inventories presented here do not necessarily represent changes in actual emissions because numerous updates in inventory methodologies have occurred between the development of the separate inventories. Also, the 2002 baseline and 2008 progress period inventories represent only annual snapshots of emissions estimates, which may not be representative of entire 5-year monitoring periods compared. To better account for year-to-year changes in emissions, annual emission totals for Nevada electrical generating units (EGU) are presented here. EGU emissions are some of the more consistently reported emissions, as tracked in EPA's Air Markets Program Database for permitted Title V facilities in the state (http://ampd.epa.gov/ampd/). RHR implementation plans are required to pay specific attention to certain major stationary sources, including EGUs, built between 1962 and 1977.

Figure 6.8-15 presents a sum of annual NO_X and SO_2 emissions as reported for Nevada EGU sources between 1996 and 2010. While these types of facilities are targeted for controls in state regional haze SIPs, it should be noted that many of the controls planned for EGUs in the WRAP states had not taken place yet in 2010, while other controls separate from the RHR may have been implemented. The chart shows a sharp decline for SO_2 and NO_X between 2005 and 2006, mostly resulting from the closure of the Mohave Generating Station in Clark County, which eliminated approximately 20,000 tons per year (tpy) of NOx and 41,000 tpy of SO_2 emissions. Steady decreases for NO_X emissions are shown for 2006 through 2010.

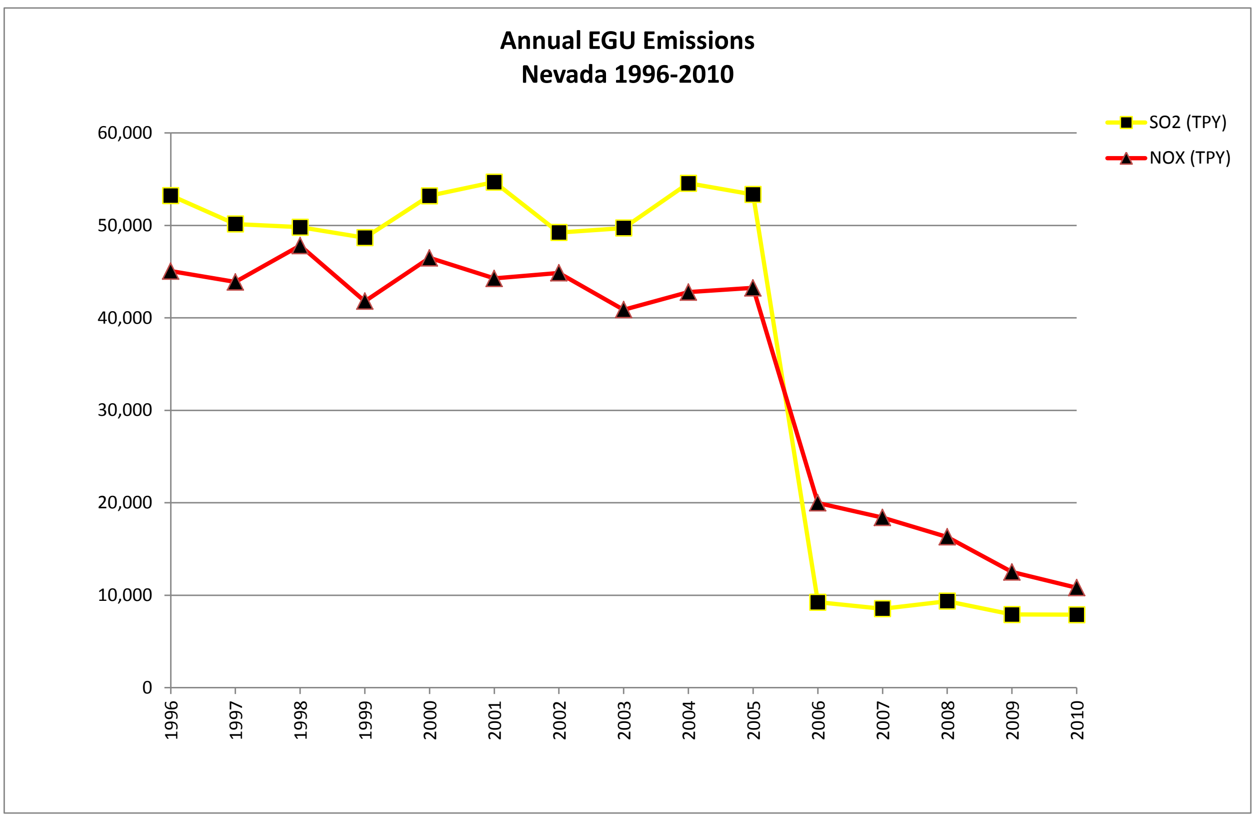

Figure 6.8-15. Sum of EGU Emissions of SO_2 and NO_X reported between 1996 and 2010 for Nevada.